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quire that pamphlets of laboratory instructions be in general published in *three languages*, and it would appear that the most advantageous plan would be to use a *three-column page* —with a polyglot repetition of all material always before each student. This program (as to the absolute novelty of which no adequate investigation has been made) would at least soon enable the men to *use* one selected foreign language for scientific purposes, and it would at the same time invite a cursory acquaintance with another.

Those students taking, *e. g.*, French and physics, would, of course, on this basis, meet for laboratory work in physics separately from those taking German and physics; but the plan would seem worthy of trial even if it were found impracticable to hire as laboratory assistants in all the respective sciences mainly men capable of fluently speaking French or German. The plan could of course be introduced in an experimental way in connection with but one science and but one of the modern languages.

BERT RUSSELL

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SYLVESTER AND CAYLEY

ON page 484 of the third edition of Ball's "Short Account of the History of Mathematics" occurs the sentence:

He [Sylvester] too was educated at Cambridge, and while there formed a life-long friendship with Cayley.

The two words "while there" seem inadvertently to have slipped in. Without them, Ball's sentence states two facts. With them, it seems capable of the paraphrase,

Cayley and Sylvester were students at Cambridge at the same time and formed then a lifelong friendship.

Both of these statements are errors, and readily proved erroneous. Thus in the *Proceedings of the Royal Society*, May 9, 1898, page xii, we read:

In 1831, at the age of seventeen, Sylvester was entered at St. John's College, Cambridge. He came out first in his first year.

In the same *Proceedings*, July 13, 1895, page ii, we read of Cayley:

Accordingly, he went to Cambridge. He was entered at Trinity College on 2d May, 1838, as a pensioner, and began residence in the succeeding October at the unusually early age of seventeen.

He thus entered Cambridge at the same age as Sylvester, seventeen, but seven long years after him, and Sylvester had previously departed forever, never again to reside in Cambridge.

In the *Proceedings of the Royal Society*, Vol. LXIII., No. 393, page xii, we read of Sylvester:

He pursued his studies till January, 1837, when he came out Second Wrangler. Being unwilling to sign the Thirty-nine Articles, he was unable to take a degree, to obtain a Fellowship, or to compete for one of the Smith's prizes. On the death of Dr. Ritchie in the same year he became a candidate for the Chair of Natural Philosophy in the London University College. He was appointed to the Chair at University College in the session 1837-38. He had some difficulty in drawing diagrams on the black-board to illustrate his lectures.

Sylvester left London for America to accept a professorship in the University of Virginia, but in 1844, when the foundations of the theory of invariants had been laid by Boole, Sylvester was back in London. For years he resided at 28 Lincoln's Inn Fields.

In the *Proceedings*, LVIII., No. 347, p. vi, we read of Cayley:

He was unwilling to take holy orders. In consequence, it became necessary to choose some profession. Cayley selected the law, left Cambridge in 1846, entered at Lincoln's Inn.

And on page viii:

It can hardly be that 2, Stone Court, proved an inspiration to mathematical research.

Thus separately thrown upon the rocky courts of the law, and by the same cause, the religious disbarments of Cambridge, the two were brought together. The biography in Sylvester's Collected Works feelingly refers to their fateful meeting. The ensuing union of their congenial and complementary minds endured without break.

Sylvester presented the first of Cayley's series of Royal Society Papers, and, inversely, Sylvester told me that if he wanted to know anything, he asked Cayley. In the Proceed-

ings, LVIII., No. 347, page viii, Forsyth says:

I have heard Cayley describe how Sylvester and he walked round the courts of Lincoln's Inn discussing the theory of invariants and covariants.

Sylvester told me that the only time he ever saw the placid Cayley beside himself was when in the midst of a discussion on the theory of forms a fat bundle of legal papers was brought in to him. Cayley dashed the plethoric bundle on the floor in an access of chagrin.

Thus London was the birthplace of this unique friendship, not the Cambridge which, before ever the gentle Cayley came, had sent out Sylvester without even a degree.

GEORGE BRUCE HALSTED

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SCIENTIFIC BOOKS

A Laboratory and Text-book of Embryology.
By CHARLES W. PRENTISS, A.M., Ph.D., Professor of Microscopic Anatomy in the Northwestern University Medical School, Chicago. Octavo of 400 pages with 368 illustrations, many of them in colors. Philadelphia and London, W. B. Saunders Company.

In this new manual of embryology an effort has been made, as stated in the preface, "to combine brief descriptions of the vertebrate embryos which are studied in the laboratory with an account of human embryology adapted especially to the medical student."

The subject-matter of the book, following an introduction, is divided into twelve chapters. The introduction presents the scope of human embryology, emphasizes its importance to the medical student and includes a résumé of the history of the science and a brief statement of the principles of growth and differentiation of the embryo. After a discussion of the methods of study, in which the dissection of embryos as a class-room practise is strongly recommended, this section of the book is concluded by a short list of carefully selected titles of journals and other works of reference dealing with embryology. Chapter I. is devoted mainly to a review of those fundamental facts which are usually learned by the student in connection with the biological studies of his premedical preparation. The description of

the human ovum, which is too brief, and the good account of the morphology and developmental cycle of the human spermatozoon should have formed part of one of the later chapters dealing specially with the human embryo. The reviews of the subjects of cell division, maturation, fertilization and the questions concerning heredity, sex determination and twinning may be amplified, if the student so desires, by consulting a number of original sources and well-known books, to which he is referred by citations in the text. In Chapter II. the topics of segmentation and the origin of the germ layers are treated from a comparative embryological standpoint, amphioxus, lizard, chick, bat and rabbit serving as representative types. The study of chick embryos is the subject of the third chapter. Here the text and figures are adapted to work in the laboratory. Directions are given for the preparation of specimens for study; descriptions of whole embryos and sections in three stages of development are presented. Descriptive embryology is resumed in Chapter IV., which discusses the subjects "fetal membranes and early human embryos." Here again the comparative method of exposition is employed with good effect. The main feature of Chapter V., which deals with the structure of small embryos of pig, is the full and careful description of the anatomy of the 10-12 mm. embryo as revealed by study of the surface form, dissections and sections. As this part is adapted primarily for use in the laboratory, the explanation given in the next chapter of the technical methods involved in the preparation of specimens, might better have been included in the present one. The technique of the dissection of embryos evolved in the Harvard Medical School for class practise is described in detail. In the same chapter (VI.) this method is advocated in the study of the face, palate, tongue, salivary glands and teeth. The remaining five chapters (VII.-XII.), comprising more than half of the book, are an account of the development of the organs and organic systems which the student may consult in connection with the more strictly laboratory work represented by